

## IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

1. (Currently amended) A frequency synthesizer comprising:
  - a fixed frequency generator configured to generate a fixed frequency signal; and
  - a variable frequency generator configured to generate a variable frequency signal;wherein:
  - the variable frequency signal is generated independently of the fixed frequency signal; ~~[[and]]~~
  - the fixed frequency signal and the variable frequency signal are combined to provide a carrier frequency signal, ~~wherein;~~
  - the carrier frequency signal is associated with an ultra-wide band (UWB) system operating in a frequency hopping mode that includes a first frequency and a second frequency; and
  - ~~the carrier frequency signal switches from a~~ operates at the first wireless channel frequency during a first period of time, operates at the ~~[[to a]]~~ second wireless channel frequency during a second period of time, and switches between the first frequency and the second frequency in an amount of time sufficient to exchange ~~[[and]]~~ information is exchanged in the frequency hopping mode using both the first wireless channel frequency and the second wireless channel frequency.
2. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator has an output that is not connected back to other components of the variable frequency generator.

3. (Previously presented) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator settles substantially faster than the fixed frequency generator.
4. (Original) A frequency synthesizer as recited in Claim 1 further comprising a mixer configured to combine the fixed frequency signal and the variable frequency signal.
5. (Original) A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is included in a transceiver.
6. (Original) A frequency synthesizer as recited in Claim 1 wherein the frequency synthesizer is used in an ultra-wide band (UWB) system.
7. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for configuring the signal generator.
8. (Original) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a signal generator and a fast switching component for operating on a plurality of generated signals by the signal generator.
9. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer.
10. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a direct digital synthesizer comprising:  
a digital to analog converter (DAC);

a parameter generator coupled to the DAC;  
wherein the parameter generator is configured to provide a configuration parameter to the DAC, and the DAC is configured to generate the variable signal based on the configuration parameter.

11. (Withdrawn) A frequency synthesizer as recited in Claim 10 wherein the parameter generator includes a lookup table.
12. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer; and the fixed frequency signal is an input to the injection-locked synthesizer.
13. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes an injection-locked synthesizer comprising:
  - a ring oscillator having a plurality of stages, where each of the plurality of stages has a stage output; and
  - a logic processor configured to perform operations on at least one of the stage outputs to obtain the variable frequency signal.
14. (Withdrawn) A frequency synthesizer as recited in Claim 13, wherein the logic processor is configured to perform an exclusive-or operation.
15. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes a delay locked loop.
16. (Withdrawn) A frequency synthesizer as recited in Claim 1 wherein the variable frequency generator includes:

a delay locked loop having a plurality of stages, wherein each of the plurality of stages has a stage output; and

a logic processor configured to perform an operation on at least one of the stage outputs to obtain the variable frequency signal.

17. (Withdrawn) A fast-hopping frequency synthesizer comprising:

a voltage controlled oscillator (VCO) configured to generate a fast-hopping output signal; and

a VCO controller coupled to the VCO for providing a first VCO configuration and a second VCO configuration;

wherein the VCO controller switches between the first VCO configuration and the second VCO configuration at a fast-hop switching speed.

18. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the fast-hopping output signal is directly synthesized.

19. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a memory for storing a configuration used to determine a VCO input.

20. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal.

21. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;

wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller.

22. (Withdrawn) A frequency synthesizer as recited in Claim 17 further comprising a feedback loop coupled to the VCO, configured to adapt the VCO to provide a fast hopping signal;

wherein the feedback loop comprises a frequency detector configured to provide a feedback to the VCO controller, and the frequency detector detects a difference between a divided output and a divided reference frequency.

23. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a digital to analog converter configured to control the VCO input.

24. (Withdrawn) A frequency synthesizer as recited in Claim 17 wherein the VCO controller comprises a switch cap digital to analog converter configured to control the voltage controlled oscillator input.

25. (Currently amended) A method for synthesizing a carrier frequency signal, comprising:  
generating a fixed frequency signal;  
generating a variable frequency signal, wherein the variable frequency signal is generated independently of the fixed frequency signal; and  
combining the fixed frequency signal and the variable frequency signal to provide the carrier frequency signal, wherein:

the carrier frequency signal is associated with an ultra-wide band (UWB) system operating in a frequency hopping mode that includes a first frequency and a second frequency; and

the carrier frequency signal ~~switches from a~~ operates at the first ~~wireless channel~~ frequency during a first period of time, operates at the [[to a]] second ~~wireless channel~~ frequency during a second period of time, and switches between the first frequency and the second frequency in an amount of time sufficient to exchange [[and]] information is exchanged in the frequency hopping mode using

both the first ~~wireless channel~~ frequency and the second ~~wireless channel~~ frequency.

26. (Withdrawn) A method for synthesizing a fast-hopping signal, comprising:
- providing a first voltage controlled oscillator (VCO) configuration to a VCO;
  - switching to a second VCO configuration at a fast-hopping switching speed; and
  - generating the fast-hopping signal.